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(पहला पुनरीक्षण)

Indian Standard

INTERNAL COMBUSTION ENGINES — TWO STAGE, ONE LITRE, DIESEL FUEL FILTERS

(First Revision)

UDC 621·436·038·772

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

July 1991 **Price Group 2**

Automotive Primemovers Sectional Committee, TED 2

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Automotive Primemovers Sectional Committee had been approved by the Transport Engineering Division Council.

This standard was first published in 1965. In view of rapid developments in the industry, particularly in this sector and its effective implementation, the need was felt to revise the standard. This revision incorporates modified design as prevalent in the industry in addition to life test and burst test which are to be carried out on specimen at the time of approval and agreed to between the purchaser and the supplier. In the preparation of this standard, considerable assistance has been derived from:

DIN 73358 : 1978	Fuel oil filter for IC engines, Filter inserts
DIN 73359 : 1977	Two stage fuel oil filter for IC engines — connecting dimensions for cover

For road vehicle application, International Organisation for Standardization (ISO), has issued the following:

ISO 4020/1 : 1979	Road vehicles fuel filters for automotive compression ignition engines — Part 1 Test methods
ISO 4020/2 : 1979	Road vehicles — Fuel filters for automotive compression ignition engines — Part 2 Test value and classification

This standard is one in the series of Indian Standards being prepared for filters. Separate standards covering 0'2 and 0'5 litres are under print. For filter inserts, a draft standard is under preparation. The methods of tests for diesel fuel filters is covered in IS 3351 : 1968 'Methods of test for diesel engine fuel filters' (*under revision*).

AMENDMENT NO. 1 NOVEMBER 1995
TO
IS 3169 : 1991 INTERNAL COMBUSTION ENGINES — TWO STAGE, ONE LITRE, DIESEL FUEL FILTERS

(First Revision)

(*Page* 1, *clause* 2) — Substitute the following revised standard for the existing one:

IS No.	*Title*
3351 : 1991	Internal combustion engines — Diesel fuel filters — Method of tests (*first revision*)

(*Page* 1, *clause* **6.1.2**) — Substitute '**4** of IS 3351 : 1991' *for* '**4.3** of IS 3351 : 1968'.

(*Page* 1, *clause* **6.1.3**) — Substitute '**5** of IS 3351 : 1991' *for* '**5.6** of IS 3351 : 1968'.

(*Page* 1, *clause* **6.1.4**) — Substitute '**5** of IS 3351 : 1991' *for* '**5.6** of IS 3351 : 1968'.

(*Page* 1, *clause* **6.1.5**) — Substitute 'IS 3351 : 1991' for the existing standard.

(*Page* 2, *clause* **6.1.7**) — Substitute 'IS 3351 : 1991' for the existing standard.

(*Page* 2, *clause* **6.1.8**) — Substitute '**9** of IS 3351 : 1991' *for* '**8** of IS 3351 : 1968'.

(TED 2)

Reprography Unit, BIS, New Delhi, India

Indian Standard

INTERNAL COMBUSTION ENGINES — TWO STAGE, ONE LITRE, DIESEL FUEL FILTERS

(First Revision)

1 SCOPE

1.1 This Indian Standard specifies the connecting and overall dimensions and performance requirements of two stage fuel filter of one litre casing capacity and filter inserts thereof used for filtering the fuel supplied to diesel engines and mounted between fuel tank and injection pump in case of gravity feeding and mounted between feed pump and injection pump in case of forced feeding. In case of filter inserts, only essential overall and fitting dimensions have been laid down in order to avoid undue restrictions on the manufacturers regarding the choice of material and design.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
397 (Part 1) : 1972	Method for statistical quality control during production : Part 1 Control charts for variables (*first revision*)
397 (Part 2) : 1985	Method for statistical quality control during production : Part 2 Control charts for attributes and count of defects (*second revision*)
397 (Part 3) : 1980	Method for statistical quality control during production: Part 3 Special control charts
3351 : 1968	Methods of test for diesel fuel filters (*under revision*)
8383 : 1977	Method of test for fabrication integrity of oil hydraulic filter elements

3 MATERIAL

3.1 Any suitable material may be used at the discretion of the manufacturer for making filter casings and filter inserts (including filter media) and other components of fuel filters to meet the functional requirements.

4 DIMENSIONS

4.1 The overall and connecting dimensions for the two stage fuel filter of one litre casing capacity including tolerances for important dimensions are given in Fig. 1.

4.2 The overall and assembly dimensions of the filter inserts are given in Fig. 2.

5 DESIGNATION

5.1 The designation of the two stage fuel filter shall indicate:

a) Capacity in litre (this means capacity of the single casing, that is, one litre means that the pre-filter bowl as well as the fine filter bowl is capable of taking one litre fuel); and

b) Direction of flow, that is, whether the fuel flows towards right (*R*) or left (*L*).

Example

A two stage fuel filter having one litre casing capacity with pre-filter and fine filter inserts, with the direction of flow towards '*left*' (as shown in Fig. 1) shall be designated as:

Two stage, One Litre Fuel Filter L IS 3169

6 PERFORMANCE REQUIREMENTS

6.1 The criteria for acceptance shall be as (**6.1.2**, **6.1.3** and **6.1.4**).

6.1.1 The Filter Media Characteristics shall be specified.

6.1.2 *Mechanical Tightness Test*

The filters when tested according to **4.3** of IS 3351 : 1968 shall be mechanically tight.

6.1.3 *Through Flow Rate Test*

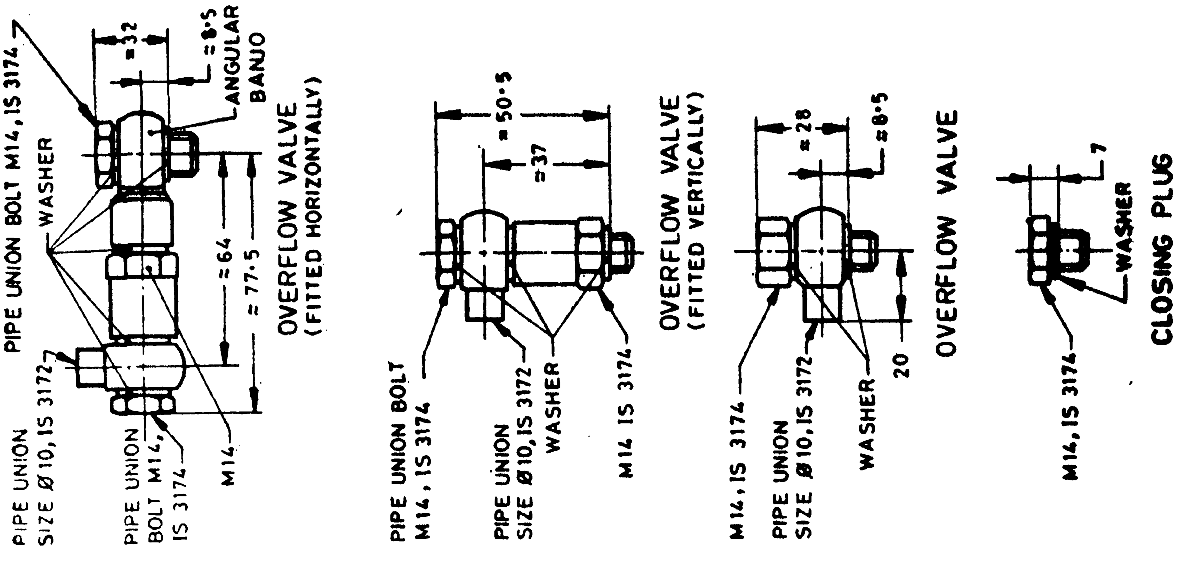
The through flow quantity, when determined according to **5.6** of IS 3351 : 1968 shall not be less than that specified by the manufacturer.

6.1.4 *Pressure Drop Test*

The pressure drop across the filter when tested according to **5.6** of IS 3351 : 1968 shall be not more than 850 mm water head at rated flow.

6.1.5 *Filtering Efficiency with Test Contaminant*

When tested as per **6** of IS 3351 : 1968 the filtering efficiency of the filter and fine filters



OVERFLOW VALVE AND PLUG

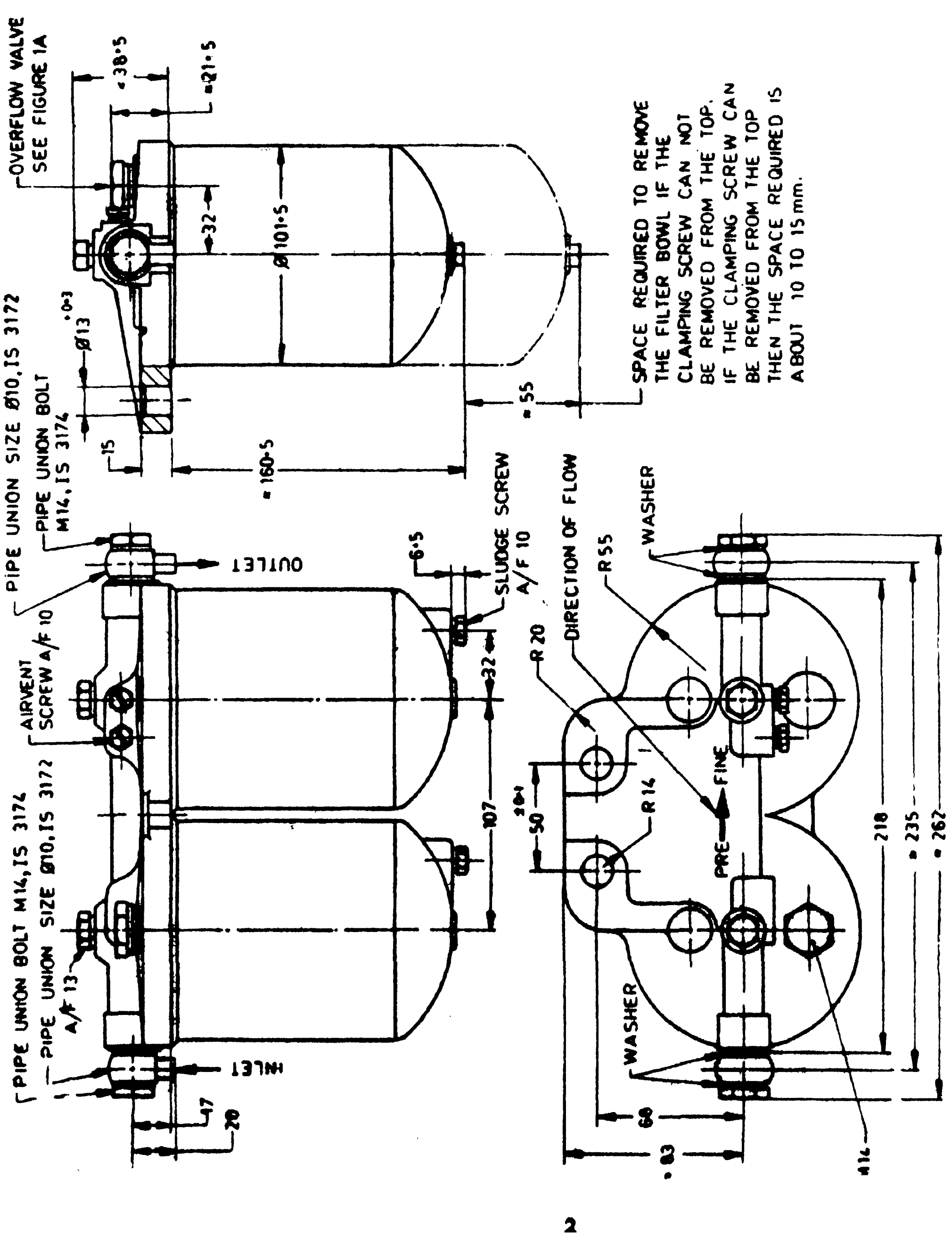
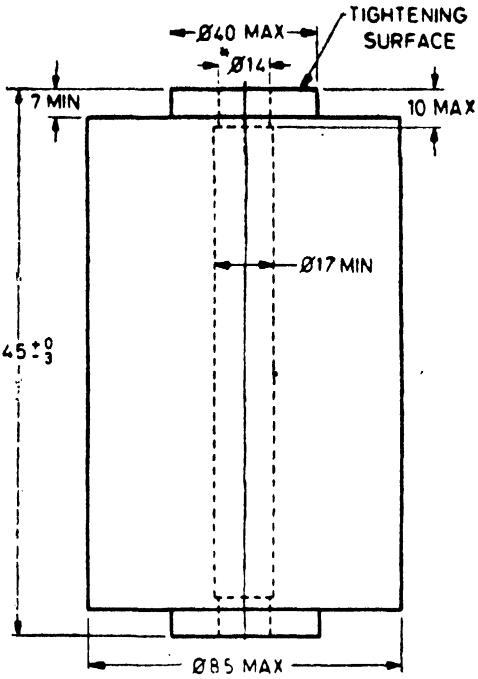

OVERFLOW VALVE SEE FIGURE 1A
≈38·5
≈21·5
32
Ø101·5
PIPE UNION SIZE Ø10, IS 3172
PIPE UNION BOLT M14, IS 3174
Ø13 +0·3
15
≈160·5
≈55
SPACE REQUIRED TO REMOVE THE FILTER BOWL IF THE CLAMPING SCREW CAN NOT BE REMOVED FROM THE TOP. IF THE CLAMPING SCREW CAN BE REMOVED FROM THE TOP THEN THE SPACE REQUIRED IS ABOUT 10 TO 15 mm.
PIPE UNION SIZE Ø10, IS 3172
PIPE UNION BOLT M14, IS 3174
OUTLET
AIRVENT SCREW A/F 10
6·5
SLUDGE SCREW A/F 10
32
107
PIPE UNION BOLT M14, IS 3174
PIPE UNION SIZE Ø10, IS 3172
A/F 13
INLET
17
20
DIRECTION OF FLOW
R 20
R 55
WASHER
FINE
PRE
R 14
20+1
50
218
≈235
≈262
WASHER
68
≈83
414

Fig. 1 Dimensions for Two Stage, One Litre Fuel Filters for Diesel Engines



*Hole should be tight for bolt $\phi 14_{h11}$.
All dimensions in millimetres.

FIG. 2 DIMENSIONS FOR FILTER INSERT

shall be as follows:

a) *For pre-filters*

Minimum 50 percent after 5 minutes of start of test and for subsequent samples gradually increasing to minimum 60 percent after 30 minutes of start of test.

b) *For fine-filters*

Minimum 65 percent after 5 minutes of start of test and for subsequent samples gradually increasing to minimum 95 percent after 30 minutes of start of test.

NOTE—If the filtering efficiency that is continued after 30 minutes of start of test, there shall be no tendency of reduction of filtering efficiency. For purposes of testing, only single bowl is to be used.

6.1.6 *Clogging Test*

The through flow of the filter after 30 minutes of start of filtering efficiency test shall be at least 65 percent of the initial flow.

6.1.7 *Life Test*

The life test on filters is a comparative test and shall be carried out in accordance with **8** of IS 3351 : 1968. (The values obtained in this test are to be noted for the purpose of guidance and information only.)

6.1.8 *Burst Test*

When tested as per **8** of IS 3351 : 1968 the filter insert shall not show any decrease in the efficiency. With the overflow plugged the pressure shall show an increase.

6.1.9 *Fabrication Integrity Test*

The filter element shall comply with the requirement when tested in accordance with IS 8383 : 1977.

7 MARKING

7.1 Two stage fuel filters shall be marked with the capacity symbol '*R*' or '*L*' and by an arrow indicating the direction of flow as the case may be, indication of source of manufacture, date of manufacture in code or otherwise.

7.1.1 The position of the bowls (or casings) containing pre-filter and fine filters inserts shall be indicated preferably on the filter cover by the words 'PRE-FILTER' and 'FINE FILTER' respectively.

NOTE—The term "micro" is also used to denote 'fine'.

7.1.2 The product may also be marked with Standard Mark.

8 SAMPLING AND CRITERIA FOR CONFORMITY

8.1 Unless otherwise agreed to, between the manufacturer and the purchaser, the sampling scheme and criteria for conformity with the standard given in Annex A, shall be followed.

9 PACKING

9.1 The filters shall be packed as per the agreement betweeen the manufacturer and the purchaser.

ANNEX A

(*Clause* 8.1)

SAMPLING OF TWO STAGE, ONE LITRE, FUEL FILTERS

A-1 PROCESS INSPECTION

A-1.1 The object of inspecting fuel filters by the purchaser is to ensure their conformity to the specification whereas inspection done by the manufacturer during production is to ensure uniformity and reduce quality fluctuations to the minimum. For process control, the manufacturer shall take representative samples of the product at regular intervals to control the quality fluctuations. For fuel filters, the inspection levels are recommended for routine control over the manufacturing process, which are as follows:

Characteristics/Tests	*Frequency of Inspection/Tests*
a) Visual characteristics:	
1) For fuel filters (direction of flow, crack, etc)	All
2) For filter inserts	All
b) Dimensional characteristics:	
1) For fuel filters (mounting dimensions, mounting hole diameter, etc)	All
2) For filter inserts:	
i) For critical dimensions	All
ii) For others	20 percent
c) Mechanical tightness	All
d) Fabrication integrity test for secondary filter element, reference to IS 8383 : 1977	100 percent
e) Through flow rate and pressure drop	Two filters for each day's production
f) Filtering efficiency and clogging tests	Two filters for each day's production
g) Life test	One sample per design for type approval purposes only as agreed between the purchaser and the manufacturer
h) Burst Test	

A-1.2 The inspection data for the results of tests done at the place of manufacture may be made available along with the material supplied to enable the purchaser to judge the acceptability of the lot.

A-1.3 When such information cannot be made available to the purchaser or when the purchaser so desires, the procedure laid down in **A-2** shall be followed for judging the conformity of the lot of the fuel filters to the requirements of this specification.

A-2 SCALE OF SAMPLING

A-2.1 Lot

In any consignment, all the fuel filters manufactured under similar processes or production shall constitute a lot.

A-2.2 Fuel filters shall be selected and examined for each lot separately for ascertaining their conformity to the requirements of the specification.

A-2.3 The number of fuel filters to be selected from a lot shall depend upon the size of the lot and shall be in accordance with column 1 and 2 of Table 1. All these fuel filters shall be taken at random from the lot.

Table 1 Scale of Sampling and Permissible Number of Defectives

(*Clause* A-2.3)

Lot Size (*N*) (1)	Sample Size for Dimensions (*n*) (2)	Permissible Number of Defectives (3)	Sub-sample for Mechanical Tightness (4)	Sub-sample for Other Tests (5)
Up to 50	5	0	2	1
51 to 100	8	0	3	1
101 to 300	13	0	4	2
301 to 500	20	0	6	2
501 to 1 000	32	1	8	3
1 001 and above	50	1	10	3

A-2.4 In order to ensure the randomness of selection, a random number table as agreed to between the purchaser and the supplier shall be followed. In case such table is not available, the following procedure is recommended for use:

> Starting from any fuel filter in a lot, count them in one order as 1, 2, 3, ... up to r and so on, where r is the integral part of N/n. Every rth fuel filter thus counted shall be selected to constitute a sample.

A-3 NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

A-3.1 For Dimensions

All the fuel filters selected according to **A-2.3** and **A-2.4** shall be first examined for dimensions (*see* 3). Any fuel filters failing to meet one or more of the requirements of the dimensional characteristics shall be considered as defective. If the number of defective fuel filters found in the sample is less than or equal to the corresponding permissible number of defectives given in column 3 of Table 1, then the lot shall be declared as conforming to the requirements of dimensional characteristics.

A-3.2 For Mechanical Tightness

The lot which has been found satisfactory in respect of dimensional characteristics shall be examined for mechanical tightness (*see* **6.1.2**). For this purpose, a number of fuel filters equivalent to the sample size indicated in column 4 of Table 1 shall be chosen at random from those already selected according to **A-3.3**. If no defectives are found the lot shall be considered to have met the requirements of mechanical tightness.

A-3.3 For Other Tests

The lot which has been found satisfactory in respect of dimensional characteristics and mechanical tightness shall be first examined for through flow quantity (*see* **6.1.3**) and pressure drop test (*see* **6.1.4**), and then for filtering efficiency (*see* **6.1.5**) and clogging (*see* **6.1.6**). For this purpose, a number of fuel filters equivalent to the sample size indicated in column 5 of Table 1 shall be chosen at random from those already selected according to **A-3.2**. The lot shall be declared as conforming to the specification, if each fuel filter passes these tests satisfactorily.

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